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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/865,238	05/25/2001	Nadeem Ahmed	1789-04801	3979

23505 7590 03/20/2006

CONLEY ROSE, P.C.

P. O. BOX 3267

HOUSTON, TX 77253-3267

EXAMINER

WARE, CICELY Q

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/865,238

Applicant(s)

AHMED ET AL.

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Appeal Brief filed 1/10/2006 with respect to claims 1-23 have been fully considered and are persuasive. The final rejection of claims 1-4, 5, 6, 7, 8, 9, 11-13, 15, 17 and 23 has been withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 5, 6, 7, 9, 11-15, 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Aslanis et al.

(US Patent 6,359,933).

(1) With regard to claim 1, Applicant's Admitted Prior Art discloses in (Fig. 2) a communications receiver that comprises: an analog-to-digital converter (26) that samples a DMT (discrete multi-tone) signal to obtain a digital receive signal; a transform module (34) coupled to the analog-to-digital converter and configured

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to determine amplitudes associated with frequency components of the digital receive signal (Pg. 2, lines 1-8, Pg. 5, lines 19-24).

However Applicant's Admitted Prior Art does not disclose a detection module configured to determine a channel symbol from the amplitudes while accounting for correlation between the amplitudes.

However Aslanis et al discloses in (Fig. 1) a detection module (60) configured to determine a channel symbol from the amplitudes while accounting for correlation between the amplitudes (col. 1, lines 55-60, col. 3, lines 8-12, col. 5, lines 29-33, col. 6, lines 30-40, col. col. 8, lines 25-44, col. 10, lines 41-61).

Therefore it would have been obvious to one of ordinary skill in the art to modify Applicant's Admitted Prior Art in view of Aslanis et al. to incorporate a detection module configured to determine a channel symbol from the amplitudes while accounting for correlation between the amplitudes in order to provide an improved method of frame synchronization in a transmission system using multi-carrier modulation (Aslanis et al., col. 2, lines 38-40).

(2) With regard to claim 2, claim 2 inherits all the limitations of claim 1. Aslanis et al. further discloses in (Fig. 1) wherein the detection module (60, 68) determines the most probable channel symbol given the amplitudes determined by the transform module (40) (col. 3, lines 28-45, col. 9, lines 35-39).

(3) With regard to claim 3, claim 3 inherits all the limitations of claim 1. Aslanis et al. further discloses in (Fig. 1) a weighted sum unit (60) associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module (40) in a manner designed to

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minimize any error between the output of the weighted sum unit and a valid output value (col. 10, lines 62-67- col. 11, lines 1-17).

(4) With regard to claim 4, claim 4 inherits all the limitations of claim 1.

Aslanis et al. further discloses the detection module (60) determines the channel symbol that corresponds to a matrix product of a matrix M and a vector of amplitudes from the transform module, wherein the matrix M minimizes a square of an expected error between the channel symbol and valid channel symbols (col. 8, lines 59-67 – col. 9, lines 1-6).

(5) With regard to claim 5, claim 5 inherits all the limitations of claim 1.

Aslanis et al. further discloses in (Fig. 1) a subtraction module (36) that removes trailing intersymbol interference from the output of the transform module (40) to obtain ISI-corrected frequency component values (col. 5, lines 18-33); a decision unit (68) in that determines a matrix product of a matrix M and a vector of ISI-corrected frequency component values to obtain the channel symbol; and a feedback module (70) that determines a matrix product of a matrix T and the channel symbol from the decision unit to provide the trailing intersymbol interference to the subtraction module (col. 10, lines 62-67 – col. 11, lines 1-17).

(6) With regard to claim 6, claim 6 inherits all the limitations of claim 1.

Aslanis et al. further discloses in a time domain equalizer that operates on the digital receive signal to maximize a percentage of impulse response energy in a predetermined interval in order to cause an effective increase in the SNR of the reference signal estimate at the receiver (col. 5, lines 17-25).

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(7) With regard to claim 7, claim 7 inherits all the limitations of claim 1.

Aslanis et al. further discloses a cyclic prefix remover that removes prefixes from the digital receive signal, each prefix being associated with a respective channel symbol (col. 5, lines 21-29)

(8) With regard to claim 9, claim 9 inherits all the limitations of claim 1.

Applicant's Admitted Prior Art further discloses in (Fig. 2) the transform module performs a fast Fourier Transform (FFT) (34) on the receive signal in each channel symbol interval (Pg. 6, lines 20-21, Pg. 11, lines 2-11).

(9) With regard to claim 11, claim 11 inherits all the limitations of claim 1.

Applicant's Admitted Prior Art further discloses a method of receiving OFDM modulated data (Pg. 5, lines 19-25).

(10) With regard to claim 12, claim 12 inherits all the limitations of claims 11 and 2.

(11) With regard to claim 13, claim 13 inherits all the limitations of claims 11 and 3.

(12) With regard to claim 14, claim 14 inherits all the limitations of claim 11. Aslanis et al. further discloses wherein said determining a channel symbol includes: determining a product of a matrix and the set of frequency component amplitudes, wherein the matrix includes at least two non-zero values in each row (col. 8, lines 29-58).

Aslanis et al. does not explicitly disclose the matrix includes at least two non-zero values in each row. However it is well known in the art that complex

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multiplication involves a using a matrix and weights being used for transmission have a non-zero coefficient.

(13) With regard to claim 15, claim 15 inherits all the limitations of claims 11 and 5.

(14) With regard to claim 16, claim 16 inherits all the limitations of claim 11. Applicant's Admitted Prior Art further discloses in (Fig. 2) processing the receive signal to shorten (26) the effective channel impulse response before performing said determining a set of frequency component amplitudes (34).

(15) With regard to claim 17, claim 17 inherits all the limitations of claims 11 and 7

(16) With regard to claim 18, claim 18 inherits all the limitations of claim 11. Applicant's Admitted Prior Art further discloses in (Fig. 2) determining a set of frequency component amplitudes includes: converting the receive signal into digital form (26); and performing a fast Fourier Transform on the digital receive signal (34).

4. Claims 8, 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Aslanis et al. (US Patent 6,359,933), as applied to claims 1, 2, 4, in further view of Kumar (US Patent 5,748,677).

(1) With regard to claim 8, claim 8 inherits all the limitations of claim 1. Applicant's Admitted Prior Art in combination with Aslanis et al. disclose all the limitations of claim 1. However Applicant's Admitted Prior Art in combination with

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Aslanis et al. do not disclose an error correction code decoder that decodes channel symbols received from the detection module.

Kumar further discloses in an error correction code decoder that decodes channel symbols received from the detection module in order to make the bit error rate of the decoded bit sequence substantially lower than that of the estimated bit sequence (col. 10, lines 44-67 - col. 11, lines 1-5, 15-25).

Therefore it would have been obvious to one of ordinary skill in the art to modify the inventions of Applicant's Admitted Prior Art in combination with Aslanis et al. in view of Kumar to incorporate an error correction code decoder that decodes channel symbols received from the detection module in order to make the bit error rate of the decoded bit sequence substantially lower than that of the estimated bit sequence (Kumar, col. 11, lines 15-25).

(2) With regard to claim 19, claim 19 inherits all the limitations of claim 1. Kumar further discloses in a transmitter that transmits an OFDM modulated signal; and a receiver that receives and demodulates a corrupted version of the OFDM modulated signal (col. 11, lines 32-52).

(3) With regard to claim 20, claim 20 inherits all the limitations of claims 19 and 2.

(4) With regard to claim 21, claim 21 inherits all the limitations of claims 19 and 3.

(5) With regard to claim 22, claim 22 inherits all the limitations of claims 19 and 4.

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(6) With regard to claim 23, claim 23 inherits all the limitations of claims 19 and 5.

Allowable Subject Matter

5. Claim 10 is allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a communications receiver. Prior art references show similar methods but fail to teach: **“wherein the transform module includes a bank of matched bandpass filters”**, as in claim 10.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047. The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Jay Patel can be reached on 571-272-2988. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware

cqw
March 14, 2006



KHAI TRAN
PRIMARY EXAMINER